Regn. No. 0920
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ESTD. 1985
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SAMPLE PAPER - 55

Time : 1 : 15 Hr. **Question : 60**

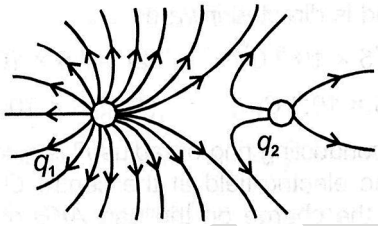
PHYSICS

01. Potential difference is given as $V(x) = -x^2 y$ volt. Find electric field at a point (1, 2).

(1) $\hat{i} + 4\hat{j} Vm^{-1}$ (2) $-4\hat{i} - \hat{j} Vm^{-1}$

(3) $4\hat{i} + \hat{j} Vm^{-1}$ (4) $4\hat{i} - \hat{j} Vm^{-1}$

02. Figure shows electric field lines due to a charge configuration, from this we conclude that



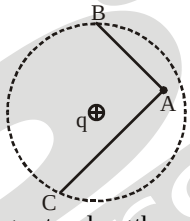
(1) q_1 and q_2 are positive and $q_2 > q_1$
(2) q_1 and q_2 are positive and $q_1 > q_2$
(3) q_1 and q_2 are negative and $|q_1| > |q_2|$
(4) q_1 and q_2 are negative and $|q_2| > |q_1|$

03. An electron having charge -e located at A, in the presence of a point charge +q located at O, is moved to the point B such that OAB forms an equilateral triangle. The work done in the process is equal to :
(1) q/AB (2) eq/AB (3) -eq/AB (4) zero

04. An electric field is spread uniformly in Y-axis. Consider a point A as origin point. The coordinates of point B are equal to (0, 2) m. The coordinates of point C are (2, 0) m. At points A, B and C, electric potentials are V_A, V_B and V_C, respectively. From the following options, which is correct?
(1) $V_A = V_C < V_B$ (2) $V_A = V_B = V_C$
(3) $V_A = V_B > V_C$ (4) $V_A = V_C > V_B$

05. The potential of a large liquid drop when eight liquid drops are combined is 20 V. Then the potential of each single drop was
(1) 2.5 V (2) 5 V (3) 7.5 V (4) 10 V

06. In the electric field on a point charge q shown, a charge is carried from A to B and from A to C. Compare the work done :



(1) work done is greater along the path AC than along AB
(2) work done is the same in both the cases
(3) work done is greater along the path AB than along AC
(4) work done is zero in both the cases.

07. A solid conducting sphere having a charge Q is surrounded by an uncharged concentric conducting hollow spherical shell. Let the potential difference between the surface of the solid sphere and that of the outer surface of the hollow shell be V. If the shell is now given a charge of –3Q, the new potential difference between the two surface is
(1) V (2) 2V (3) 4V (4) –2V

08. In uniform electric field $\vec{E} = E_0\hat{i} + 2E_0\hat{j}$, where E_0 is a constant, exists in a region of space and at (0, 0) the electric potential V is zero, then the potential at $(x_0, 0)$ will be

(1) zero (2) $-E_0 x_0$ (3) $-2E_0 x_0$ (4) $-\sqrt{5} E_0 x_0$

09. Two insulating small spheres are rubbed against each other and placed 96 cm apart. If they attract each other with a force of 0.1 N, how many electrons were transferred from one sphere to the other during rubbing?
(1) 10^{11} (2) 2×10^{13}
(3) 3×10^{11} (4) 4×10^{11}

10. Which of the following is correct regarding electric charge?
(i) If a body is having positive charge i.e. shortage of electrons
(ii) If a body is having negative charge i.e. excess of electrons

(iii) Minimum possible charge = $\pm 1.6 \times 10^{-19}$ C
(iv) Charge is quantised i.e. Q = ±ne,
where n = 1, 2, 3, 4, ...
(1) (i) and (ii) (2) (ii) and (iii)
(3) (i), (ii), (iii) (4) All

11. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere?

$\left(\frac{1}{4\pi\varepsilon_0} = 9\times10^9 \text{N m}^2/\text{C}^2\right)$

(1) 1.28×10^4 N/C (2) 1.28×10^5 N/C
(3) 1.28×10^6 N/C (4) 1.28×10^7 N/C

12. In a region with uniform electric field the number of lines of force for unit area is E. If a spherical metallic conductor is placed in this region, the number of lines of force per unit area inside the conductor will be :
(1) E (2) more than E
(3) less than E (4) zero.

13. A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p. If the distance of Q from the dipole is r (much larger than the size of the dipole), then the electric field at Q is proportional to
(1) p^2 & r^{-3} (2) p & r^{-2} (3) p^{-1} & r^{-2} (4) $p^2 \propto r^{-6}$

14. Two metallic spheres of radii 1 cm and 2 cm are given charges 10^{-2} C and 5×10^{-2} C respectively. If they are connected by a connecting wire, the final charge on bigger sphere is :
(1) 2×10^{-2} C (2) 4×10^{-2} C
(3) 1×10^{-2} C (4) 3×10^{-2} C.

15. Electric field on the axis of a small electric dipole at a distance r is $\vec{E}_1$ and $\vec{E}_2$ at a distance of 2r on a line of a perpendicular bisector then

(1) $\vec{E}_2 = -\frac{\vec{E}_1}{8}$ (2) $\vec{E}_2 = -\frac{\vec{E}_1}{16}$

(3) $\vec{E}_2 = -\frac{\vec{E}_1}{4}$ (4) $\vec{E}_2 = \frac{\vec{E}_1}{16}$

CHEMISTRY

16. In a gaseous reaction of the type $aA + bB \longrightarrow cC + dD$, which is wrong?
(1) a litre of A combines with b litre of B at same P & T to give C and D
(2) a mole of A combines with b mole of B to give C and D
(3) a g of A combines with b g of B to give C and D
(4) a molecules of A combines with b molecules of B to give C and D

17. One litre of CO_2 is passed over hot coke. The volume becomes 1.4 litre. The per cent composition of products is:
(1) 0.6 litre CO
(2) 0.8 litre CO_2
(3) 0.6 litre CO_2 and 0.8 litre CO
(4) None of these

18. The density of a solution prepared by dissolving 120 g of urea (mol. Mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity if this solution is
(1) 0.50 M (2) 1.78 M
(3) 1.02 M (4) 2.05 M

19. The mole fraction of a given sample of I_2 in C_6H_6 is 0.2. The molality of I_2 in C_6H_6 is
(1) 0.32 (2) 3.2 (3) 0.032 (4) 0.48

20. Number of mole in 1 m^3 gas at NTP are:
(1) 44.6 (2) 40.6 (3) 42.6 (4) 48.6

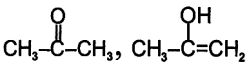
21. In ethane, ethene and ethyne molecules, carbon atoms are present in hybrid states of
(1) sp^3—sp^2, sp^2—sp^2, sp^2—sp
(2) sp^3—sp, sp^3—sp^2, sp^3—sp
(3) sp^3—sp^3, sp^2 sp^2, sp—sp
(4) sp^2—sp^3, sp^2—sp, sp^2—sp^3

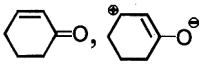
22. Rank the following in decreasing order of heat of hydrogenation :

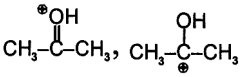
(i)  (ii)  (iii) 

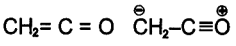
(1) i > ii > iii (2) ii > iii > i
(3) i > iii > ii (4) iii > i > ii

23. Which of the following pairs of structures do not represent resonating structures?

(1) 

(2) 

(3) 

(4) 

24. Aromatic compounds are:

(1)  (2) 

(3)  (4) 

25. Which of the following is anti-aromatic species?

(1)  (2)  (3)  (4) 

26. Which of the following molecules represents the order of hybridisation sp^2, sp^2, sp, sp from left to right atoms?
(1) $CH_3 - CH = CH - CH_3$ (2) $CH_2 = CH - CH = CH_2$
(3) $CH_2 = CH - C \equiv CH$ (4) $HC \equiv C - C \equiv CH$

27. The electronegativity of the following elements increases in the order
(1) S < P < N < O (2) P < S < N < O
(3) N < O < P < S (4) N < P < S < O

28. Which of the following oxides is not expected to react with sodium hydroxide?
(1) B_2O_3 (2) CaO (3) SiO_2 (4) BeO

29. Atomic number of few elements are given. Which of these belong to d block of elements?
(1) 29 (2) 38 (3) 43 (4) 53

Select the correct answer using the codes given below:
(1) 1 and 2 (2) 1 and 3
(3) 1, 2 and 3 (4) 2, 3 and 4

30. The electronic configuration of outermost orbit of an element is $4s^2 4p^4$. In the long form of the periodic table, the place of this element would be in:
(1) 6 group, fourth period
(2) 2 group, fourth period
(3) 16 group, fourth period
(4) 16 group, 6 period

BOTANY

31. The process of plasmolysis is usually
(1) Reversible (2) Irreversible
(3) Active (4) both (1) and (3)

32. In plants capillarity is aided by the
(1) Small diameter of tracheids
(2) large diameter of tracheids
(3) Small diameter of vessel elements
(4) Both (1) and (3)

33. Soil less cultivation of plant in a defined nutrient solution is called
(1) Pisciculture
(2) Bonsai
(3) Hydroponics
(4) Aquaculture

34. The prominent symptom of manganese toxicity is the appearance of
(1) Chlorotic veins surrounded by black spots
(2) Chlorotic veins surrounded by brown spots
(3) Brown spots surrounded by chlorotic veins
(4) Black spots surrounded by chlorotic veins

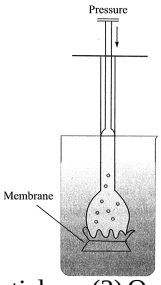
35. Any mineral ion concentration in tissues that .....a..... the dry weight of tissues by about ....b.... is considered to toxic
(1) a-enhances, b-10 mmole/kg
(2) a-reduces, b-10 mmole/kg
(3) a-enhances, b-10percent
(4) a-reduces, b-10 percent

36. Essential elements are often supplied to the crop plants through fertilizers. The components of fertilizers are
(1) Micro-nutrients (Cu, Zn, Fe, Mn etc.)
(2) Macro-nutrients (N, P, K, S etc.)
(3) Both (1) and (2) (4) Na, Se, Si, Co

37. Osmosis can be demonstrated by
(1) Potato osmometer
(2) Thistle funnel experiment
(3) Cobalt-chloride paper method
(4) Both (1) and (2)

38. Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways
(1) One in xylem and second in phloem
(2) One is active and second is passive
(3) One is apoplast and second is symplast
(4) One is tracheid and second is vessel

39. The pressure shown in the figure is called



(1) Osmotic potential (2) Osmotic pressure
(3) Turgor pressure (4) Suction pressure

40. Which pathway involves cell wall and intercellular spaces?
(1) Vascular pathway
(2) Protoplast pathway
(3) Symplast pathway
(4) Apoplast pathway

41. Path of water movement from soil to xylem is
(1) Metaxylem → Protoxylem → Cortex → Soil →Root hair
(2) Cortex → Root hair → Endodermis → Pericycle → Protoxylem → Metaxylem
(3) Soil → Root hair → Cortex → Endodermis →Pericycle → Protoxylem → Metaxylem
(4) Pericycle → Soil → Root Hair → Cortex →Endodermis → Protoxylem → Metaxylem

42. Ions are absorbed from the soil by
(1) Passive transprot
(2) Active transport
(3) Both active and passive transport
(4) Imbibition

43. Fill in the blanks
1. Despite the absence of a heart or a circulatory system in plants, the flow of water upward through the xylem in plants can achieve fairly high rates up to ...a.... metres per hour.
2. Less than ...b.... percent of the water reaching the leaves is used in photosynthesis and plant growth.
3. Water loss from a leaf can be studied by using ...c...
4. Most researchers agree that water is mainly ...d... through the plant.
(1) a–10, b–5, c–potato osmometer, d–pushed
(2) a–5, b–10, c–cobalt chloride paper, d–pulled
(3) a–15, b–1, c–cobalt chloride paper, d–pulled
(4) a–10, b–1, c–cobalt chloride paper, d–pulled

44. The most widely accepted theory for ascent of sap in trees is
(1) Capillarity
(2) Role of atmospheric pressure
(3) Pulsating action of living cell
(4) Transpiration pull and cohesion theory of Dixon and Jolly

45. Most water flow in root occurs via apoplast as
(1) Cortical cells are living cells
(2) Cortical cells are loosely arranged
(3) Cortical cells are thin walled
(4) All of the above

ZOOLOGY

46. Which one of the following hormone stimulates the 'let-down' (release) of milk from the mother's breasts when the baby is sucking?
(1) Progesterone (2) Oxytocin
(3) Prolactin (4) Relaxin

47. According to the accepted concept of hormone action, if receptor molecules are removed from target organs, then the target organs will
(1) not respond to the hormone
(2) continue to respond to hormone without any difference
(3) continue to respond to the hormone but in the opposite direction
(4) continue to respond to the hormone but will require higher concentration

48. Which of the following are features of chordate?
(1) Notochord is present.
(2) CNS is dorsal, hollow and single.
(3) Pharynx perforated by gill slits.
(4) Heart is ventral.
(5) A post-anal is present.
(1) All except (4) (2) All except (2)
(3) All of these (4) All except (5)

49. How many of the following belongs to subphylum urochordate?
Ascidia, Salpa, Doliolum, Branchiostoma, Petromyzon, Myxine
(1) 1 (2) 2 (3) 3 (4) 4

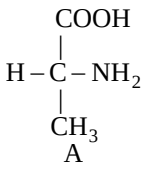
50. Vertebrates have:
(1) Ventral muscular heart with 2, 3 or 4 chambers.
(2) Kidneys for excretion and osmoregulation.
(3) Paired appendages which may be fins or limbs.
(4) All of these

51. Which of the following fish possess electric organs?
(1) Scoliodon (Dogfish)
(2) Trygon
(3) Torpedo
(4) Pristis (Sawfish)

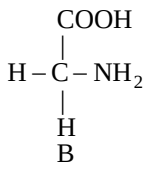
52. (1) Streamlined body
(2) Both marine and fresh water
(3) Mouth is terminal
(4) Air bladder present
(5) 4 pairs of gills with operculum
The above, characters belong to class
(1) Cyclostomata (2) Chondrichthyes
(3) Osteichthyes (4) Amphibia

53. Identify, in which of the following carbon compounds, heterocyclic rings can be found ?
(1) Proteins (2) Amino acids
(3) Nitrogen bases (4) Lipids

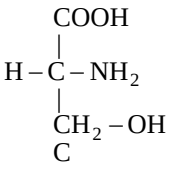
54. Name the amino acids A-C correctly.



A



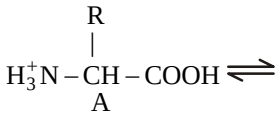
B

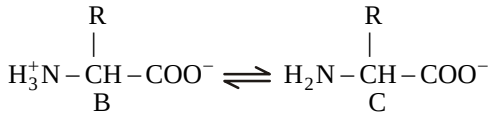


C

(1) A-Glycine, B-serine, C-Alanine
(2) A-Alanine, b-Glycine, C-Serine
(3) A-Serine, B-Glycine, C-Alanine
(4) A-Serine, B-Alanine, C-Glycine

55. Identify the zwitter ionic form in the given reversible reaction.





Choose the correct option.
(1) A (2) C
(3) B (4) None of the above

56. Which of the following secondary metabolites ar used as drugs?
(1) Vinblastin and curcumin
(2) Anthocyanin
(3) Gums and cellulose
(4) Abrin and ricin

57. Zinc is a cofactor for which enzyme?
(1) Trypsine (2) Peroxidase
(3) Carboxy peptidase (4) Apoenzyme

58. Match the following columns.

	Column-I		Column-II
A.	Tyrosine	1.	Enzyme
B.	Oxytocin	2.	Alkaloids
C.	Renin	3.	Hormone
D.	Morphine	4.	Amino acid

(1) A-1, B-2, C-3, D-4 (2) A-4, B-3, C-1, D-2
(3) A-3, B-4, C-1, D-2 (4) A-1, B-3, C-2, D-4

59. Match the following columns.

	Column –I		Column-II
A.	Dethydrogenases	1.	Interconversion of optical, geometrical positional isomers
B.	Ligases	2.	Group transfer
C.	Isomerases	3.	Oxidoreduction between two substrates
D.	Hydrolases	4.	Linking together of two bonds
E.	Transferases	5.	Hydrolysis of bonds

(1) A-5, B-4, C-1, D-2, E-3
(2) A-4, B-3, C-5, D-2, E-1
(3) A-5, B-4, C-2, D-3, E-1
(4) A-3, B-4, C-1, D-5, E-2

60. Which of the following statements is/are incorrect?
I. Left end of a polysaccharide is called non-reducing end, while right end is called reducing end.
II. Starch and glycogen are branched molecules.
III. Starch and glycogen are the reserve food materials of plants and animals, respectively.
IV. Starch can hold iodine molecules in its helical secondary structure,but cellulose being non-helical, cannot hold iodine.
(1) I and II
(2) All statements are incorrect
(3) Only IV
(4) None of the above